I. Objection to Drawings

The drawings are objected to because the drawing includes miscellaneous information including a date and time on the bottom of the figures and illegible words in the corners of the boxes in which the figures are enclosed. Applicants are herewith enclosing a proposed drawing correction. Applicants believe that this amendment overcomes the Examiner's objection.

II. Specification

The disclosure is objected to because of the informalities. In accordance with the Examiner's suggestions and to correct a typographical error, the term "60" on page 6 line 11 has been changed to --12--.

The specification has been objected to because the term "56" is suggested to be used to represent both the bottom edge and the bellows. In order to clarify the invention, the specification has amended at page 5 line 17 to remove the numerical designation "56". Applicants believe that this amendment overcomes the Examiner's objection.

III. Rejection of claims under 35 U.S.C. §102(b)

The Examiner has rejected claim 1 under 35 U.S.C. §102(b)as being anticipated by Muramatsu et al. (U.S. Patent 5,941,512). Specifically, the Examiner suggests that Muramatsu et al. show a device for adaptive vibration attenuation comprising a passive isolator and a pneumatic actuator which varies stiffness characteristics.

Claim 2 is rejected under 35 U.S.C. §102(b) as being anticipated by Hoevel (U.S. Patent No. 1,951,020). Hoevel is suggested to show in Figure 2, a device for adaptive vibration attentuation comprising a passive isolator and a mechanical actuator which varies stiffens characteristics. Applicants respectfully disagree.

First, claim 1 of the present invention has been amended to clarify that the pneumatic actuator comprises an upper pressure chamber and a lower pressure chamber present on either side of a non-linear spring. Support for this amendment is found at page 4, lines 30-31 and throughout the specification. Contrary to the Examiner's suggestion, Muramatsu et al. Do not teach a pneumatic actuator. As clearly shown in column 2, lines 20-23, the vibration damper does not incorporate any actuator means. Further, since Muramatsu et al. Do not teach a lower pressure

chamber and an upper pressure chamber, this reference cannot anticipate claim 1 as amended.

It is therefore respectfully requested that this rejection be withdrawn.

Claim 2 of the present invention has been amended to clarify that the mechanical actuator is comprised of a coiled spring, a non-linear spring, and a load supporting rod. Further, the load supporting rod passes through the center of the coiled spring. Support for this amendment is found at page 7, line 31 through page 8, line 5 and throughout the specification.

Hoevel teaches an antivibration support device with a coiled spring (17) adjacent to a top support member (16). Hoevel doe not teach any load supporting rod passing through the center of the coiled spring. Thus, Hoevel cannot anticipate claim 2 as amended. It is therefore respectfully requested that this rejection be withdrawn.

IV. Conclusion

Applicants believe that the foregoing comprises a full and complete response to the Office Action of record. Accordingly, favorable reconsideration and subsequent allowance of the pending claims is earnestly solicited.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment, captioned "Version with Markings to Show Changes Made".

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

<u>**In the Specification**</u>**:**

Paragraph beginning at page 4, line 29, has been amended as follows:

Figure 1 shows a side view of a pneumatic unit comprising an upper pressure chamber **10** and a lower pressure chamber **12** present on either side of an non-linear spring **14**, a load supporting rod **16**, a top support plate **18**, a bottom support plate **20**, a supporting plate **22**, fasteners **24** and connectors **26**. The non-linear spring **14** is comprised of an upper metal support **28**, an elastomeric isolator **30**, and a lower metal support **32**. The upper pressure chamber is comprised of a top side **34**, an upper cylindrical side wall **36** with a top edge and a bottom edge, upper rubber bellows **38**, an upper air inlet **40**, and a bottom side to the upper pressure chamber **42**. The lower pressure chamber **12** is comprised of a top side **44**, a lower cylindrical side wall **46**, lower rubber bellows **48**, a lower air inlet **50**, and a bottom to the lower pressure chamber **52**. The upper pressure chamber contains rubber bellows with a top edge **54** and bottom edge **56**. The top edge **54** of the upper rubber bellow **48** is secured between

the underside of the upper pressure chamber top **34** and the top edge of the cylindrical side wall **36**. The bottom edge of the upper pressure chamber rubber bellows **~~56~~** is secured between the bottom edge of the cylindrical side wall **36** and the top edge of the lower metal support **32** of the nonlinear spring **14**. The lower pressure chamber **12** contains a lower rubber bellows **48** with a top and bottom edge. The top edge of the lower rubber bellow **48** is secured between the bottom side of the lower metal support **32** and the top edge of the lower pressure chamber cylindrical side wall **46**. The bottom edge of the lower rubber bellow **48** is secured between the bottom edge of the cylindrical side wall **46** and the top edge of the bottom support plate **20**. The upper pressure chamber rubber bellows **38** and lower pressure chamber rubber bellows **48** secured in this way each take on a doughnut shape. An upper air inlet **40** present on the cylindrical side wall **36** of the upper pressure chamber **10** allows air to be pumped into the upper pressure chamber **10** which transfers increased load onto the nonlinear spring **14**. A top support plate **18** is in contact with the top side of the upper pressure chamber **10**. The top support plate **18** is attached by fasteners **24** to connectors **26** which are

attached to the top side of a supporting plate **22**. The bottom side of the support plate **22** is attached to the bottom support plate **20** by multiple fasteners **24** to the under side of the bottom support plate. A load supporting rod **16** runs from the top support plate **18** through the center of: the space in the center of the upper rubber bellows **38** in the upper pressure chamber **10**, the nonlinear spring **14**, the supporting plate **22**, space in the center of the lower rubber bellows **48** in the lower pressure chamber ~~**60**~~ 12 and the bottom support plate **20**. The load supporting rod **16** has a smaller diameter at the lower end and a larger diameter at the upper end. The larger diameter end of the load supporting rod **16** passes through the center of the top support plate **18** and through the space in center of the doughnut shaped upper rubber bellows **38** of the upper pressure chamber **10**. Due to its larger dimension, the larger diameter end of the load supporting rod **16** can not pass through the hole in the top of the upper metal support **28** of the nonlinear spring **14**. The actuator is part of a pneumatic system including a pump, pressure chambers, and a pressure reservoir to facilitate rapid response times for stiffening and softening. By introducing air into the upper pressure chamber **10**, a load is applied to the nonlinear

spring. Similarly, the lower pressure chamber **12** reduces the load on the non-linear spring **14**. A load due to pressure in the upper chamber is added to the external supported load while a load due to pressure in the lower chamber is subtracted from the external supported load. The nonlinear spring **14** stiffness changes with varying loads. By applying pressure to either the upper pressure chamber **10** or the lower pressure chamber **12**, the natural frequency of the system may be regulated. One or two pressure chambers may be present depending on the application. Using this device, adaptive vibration attenuation is implemented by passive vibration mounts that allow the adjustment of their dynamic stiffness characteristics in response to changes in the excitation or loading conditions. The mount stiffness is varied by combining a passive vibration mount with highly non-linear force-deflection characteristics with a one-directional or bi-directional pneumatic actuator. These adjustments of mount characteristics result a change of the natural frequency by shifting the operating point of the nonlinear spring. Non-invasive, non-contact sensors are used together with hardware- or software-based signal processing to identify the excitation

displacement and/or force signal and to generate the appropriate adjustments of the passive vibration mount characteristics.

In the claims:

Claims 1 and 2 have been amended as follows:

1. (Amended) A device for adaptive vibration attenuation comprising a passive isolator and a pneumatic actuator which varies stiffness characteristics, wherein the pneumatic actuator comprises an upper pressure chamber and a lower pressure chamber present on either side of a non-linear spring.

2. (Amended) A device for adaptive vibration attenuation comprising a passive isolator and a mechanical actuator which varies stiffness characteristics wherein the mechanical actuator is comprised of a coiled spring, a non-linear spring, and a load supporting rod, and wherein the load supporting rod passes through the center of the coiled spring.